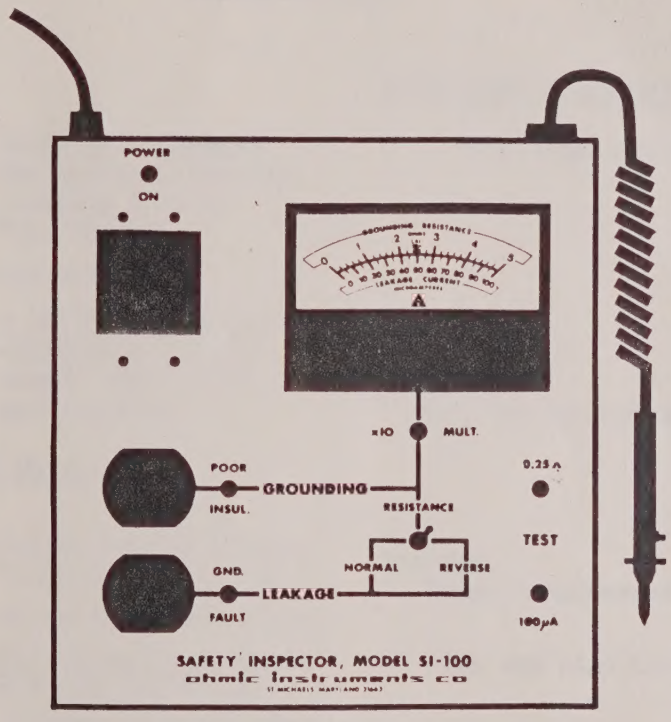
MP MASTER
MA33611

ohmic instruments co
ST. MICHAELS, MARYLAND 21663
TELEPHONE: (301) 822-4844



SAFETY INSPECTOR
MODEL SI-100

OPERATING NOTES

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SAFETY INSPECTOR

Models SI-100 and SI-100N

Specifications

LEAKAGE CURRENT

Range:	0-100 Microamperes and 0-1 Milliamperes. Accuracy ± 5% at Full Scale.
Input Impedance:	1000 Ohms ± 5%.
100 Microampere Test:	A 100-Microampere D.C. calibrator checks proper functioning and accuracy.

GROUNDING RESISTANCE AND INSULATION

Range:	0-0.5; 0-5 Ohms Full Scale Accuracy ± 5%.
Test Current:	40 Milliamperes, D.C.
Light Indicator:	Poor Insulation light comes on if the D.C. resistance of the hot or neutral is less than .5 Megohm to ground.
Test Voltage:	100 Volts, D.C. ± 5%. Test current is limited to 250 Microamperes.
Internal Standard:	0.25 Ohms ± 3%.

OTHER SPECIFICATIONS

Test Receptacles:	Two. Heavy duty NEMA hospital grade. (One non-energized for grounding resistance and insulation; the other for equipment leakage tests.)
Maximum Test Current Rating:	12 Amperes rms; Overload protection with two-pole magnetic breaker.
Standby Power Requirement :	120 Volts, 60 Hertz, 5 Watts.
Plug and Line Cord:	6 feet long, supplied with standard 3-prong plug.
Probe:	4-foot long coil cord.
Case Size and Housing:	4 inches high; 8 inches wide; 8 inches long. Supplied with high impact shielded carrying case.
	Model SI-100
	Model SI-100N - With optional Neutral switch
Delivery:	Off-Shelf.

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OPERATING NOTES

The Model SI-100 is designed to check rapidly the electrical safety of medical and other line-operated equipment having no patient leads. It can also be used to check voltage differentials and grounding in patient areas.

Some specifications are:

* Grounding Resistance: 0 to 0.5 ohm or 0 to 5 ohms;
  Resolution: 0.01 ohm.
* Leakage Current: 0 to 100 uA/mV or 0 to 1000 uA/mV;
  Resolution: ± 2.5 uA/mV on voltage gradient; Accuracy: ± 5%.
* Poor Insulation: LED light comes on if resistance is below 1 megohm.

PANEL CONTROLS:

1) Two-Pole Magnetic Breaker. Applies power to test receptacles and metering circuit. Rating: 12.5 Amps.

2) Power ON Light. Indicates power is applied to unit.

3) Panel Meter. Top Scale: Grounding Resistance 0 to 0.5 ohms.
Bottom Scale: Leakage Current 0 to 100 microamperes.

4) Hospital-Grade Duplex Receptacle: GROUNDING: For grounding resistance test (non-energized receptacle). LEAKAGE: For leakage current test (energized receptacle).

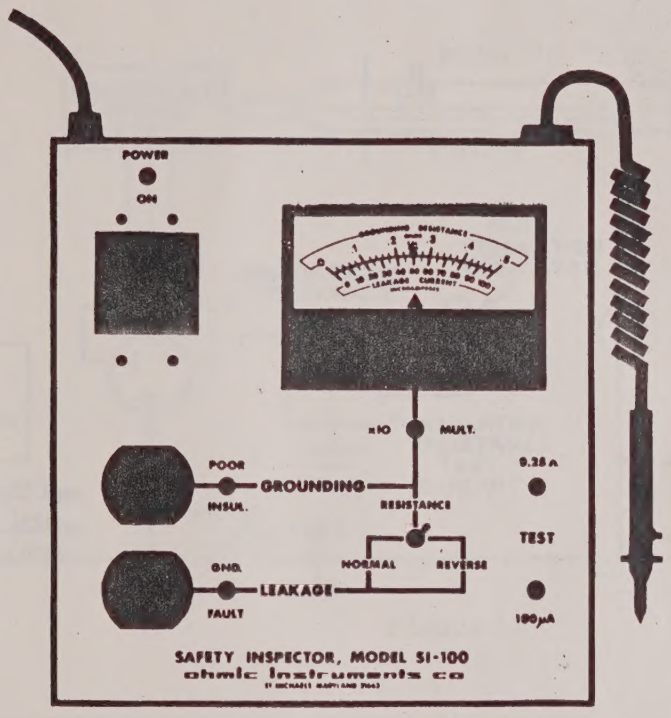
5) Poor Insulation. LED light comes on when:
   1) Hot/Neutral insulation resistance is below 1 megohm;
   2) Model SI-100 is plugged into a reverse polarized receptacle;
   3) Open ground return on receptacle.

6) Ground Fault: Red light comes on if the probe tip or the ground slot of the leakage receptacle comes in contact with hot line.

7) Selector Switch. Selects Normal or Reverse leakage polarities or Resistance test in the mid-position.

8) x10 Multiplier. Multiplies resistance or leakage readings ten times when pushbutton is depressed. Full scale readings are 5 ohms and 1 milliampere.

OPERATING NOTES



PANEL CONTROLS (Continued)

9) TEST 0.25 Ohms. An internal calibration standard verifies proper operation and accuracy of the resistance probe.

10) TEST 100uA. Checks full scale accuracy of meter when pushbutton is depressed.

11) Resistance Probe. A coil cord plugs into the top of the SI-100. When depressed, the pushbutton on the probe connects current source to the meter.

12) Fuse - F_2 1/16 Amp. Located below the Resistance Probe. Protects electronics if the Resistance Probe touches hot line.

13) Fuse - F_1 1/4 Amp. Located below the line cord. Protects electronics in case of fault.

14) Line Cord. 6 feet long (SJ 14-3).

OPERATING NOTES

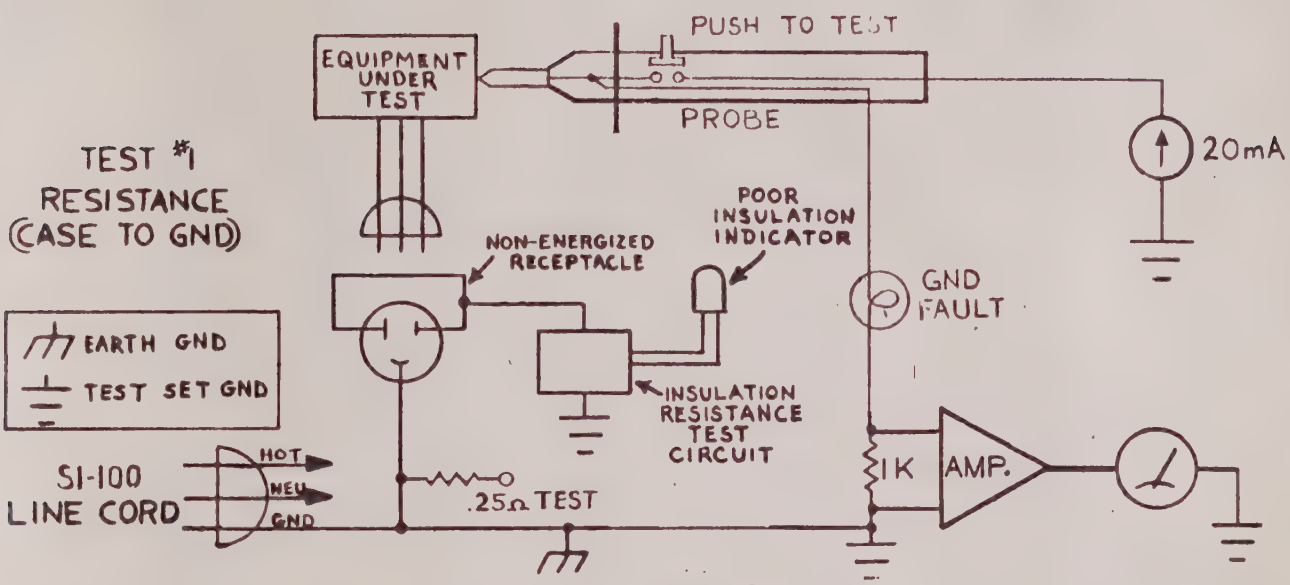


Figure 1.

USING THE SAFETY INSPECTOR

Resistance/Voltage Gradient Tests. Figure 1 shows the basic function blocks during resistance measurements. The Resistance Prob has a permanent connection to the input of the metering circuit with a sensitivity of 10 microamperes/10 millivolts, Full Scale. This allows the user to check for low voltage differentials with respect to ground and also, to verify that no voltage is preser before depressing the Resistance Probe's pushbutton. This pushbutton injects a 20-milliampere, D. C., current during the resistance test. (NFPA 76B calls out a 0.15-ol maximum, grounding resistance from the U-Blade of the equipment under test (E. U. T. to the point where the green wire is connected to the metal case. At other points of the exposed metal surfaces of the E. U. T., resistance values may be higher.)

Test Procedure: 1) Plug E. U. T. into the GROUNDING receptacle of SI-100;

2) Touch Resistance Probe to metal surfaces, preferably close to the point where the green wire of the line cord is connected to the item being tested.

3) Turn on the power switch of the E. U. T. If Poor Insul. LED light comes on, the insulation R of Hot/Neutral is below 1 megohm. Record reading or supplied test form, TF-24.

MEDICAL EQUIPMENT WITHOUT PATIENT LEADS USING OHMIC SAFETY INSPECTOR - MODEL - SI-100

Equipment: Electric Bed Mfgr: ACC Co. Model: SI 100

Serial No. 1009-12 Control No.: 301 Location: Ward 2 East

				*					
Test Date					1/3/78	6/3/78			
Initials				Limits	H.B.K	B.J.C.			
Physical Inspection				60 Hz	OK	OK			
TESTS IN GROUNDING RECEPTACLE (NON-ENERGIZED)									
1.	Resistance from Plug, U-Blade, to Case			0.15 Ohm	.0.1Ω	0.12Ω			
	Insulation: Hot/Neu. to Gnd. (above Meg. no LED on)			1 Meg	OK	OK			
2.	CASE TO GROUND LEAKAGE CURRENT	Normal Polarity	Power ON	100 uA	25μA	28μA			
			Power OFF	100 uA	10μA	12μA			
		Reverse Polarity	Power OFF	100 uA	10μA	10μA			
			Power ON	100 uA	32μA	35μA			
3.	LEAKAGE CURRENT or VOLTAGE GRADIENT BETWEEN RECEPTACLE GROUNDS AND METAL SURFACES	O.R., C.C.U., I.C.U.		10 uA 10 mV	under 10μA	under 10μA			
		General Patient Area		100 uA 100 mV					

* Maximum Allowable Readings Suggested by NFPA, NEC and AAMI.

MEDICAL EQUIPMENT WITHOUT PATIENT LEADS USING OHMIC SAFETY INSPECTOR - MODEL - SI-100

Equipment: Mfgr: Model:

Serial No. Control No.: Location:

Test Date			*					
Initials			Limits					
Physical Inspection			60 Hz					
TESTS IN GROUNDING RECEPTACLE (NON-ENERGIZED)								
1.	Resistance from Plug, U-Blade, to Case		0.15 Ohm.					
	Insulation: Hot/Neu. to Gnd. (above Meg. no LED on)		1 Meg.					
2.	CASE TO GROUND LEAKAGE CURRENT	Normal Polarity	Power ON	100 uA				
			Power OFF	100 uA				
		Reverse Polarity	Power OFF	100 uA				
			Power ON	100 uA				
3.	LEAKAGE CURRENT or VOLTAGE GRADIENT BETWEEN RECEPTACLE GROUNDS AND METAL SURFACES	O.R., C.C.U., I.C.U.		10 uA 10 mV				
		General Patient Area		100 uA 100 mV				

* Maximum Allowable Readings Suggested by NFPA, NEC and AAMI.

OPERATING NOTES

Test Procedure: (Continued)

Voltage Differential Tests: To test for voltage differentials, touch Resistance Probe to all metal surfaces and to ground slots of receptacles in patient areas. Do Not Depress the Probe's pushbutton. Meter now reads 0 to 10 millivolts/microamperes, Full Scale, with the selector switch in Resistance position and 0 to 100 millivolts/microamperes, Full Scale, when the selector switch is placed in the Normal or Reverse polarity position. Record readings on TF-24 test form.

CAUTION: For convenience, the Resistance Probe is permanently connected to the input of the amplifier. Avoid shorting probe tip to ground during leakage tests.

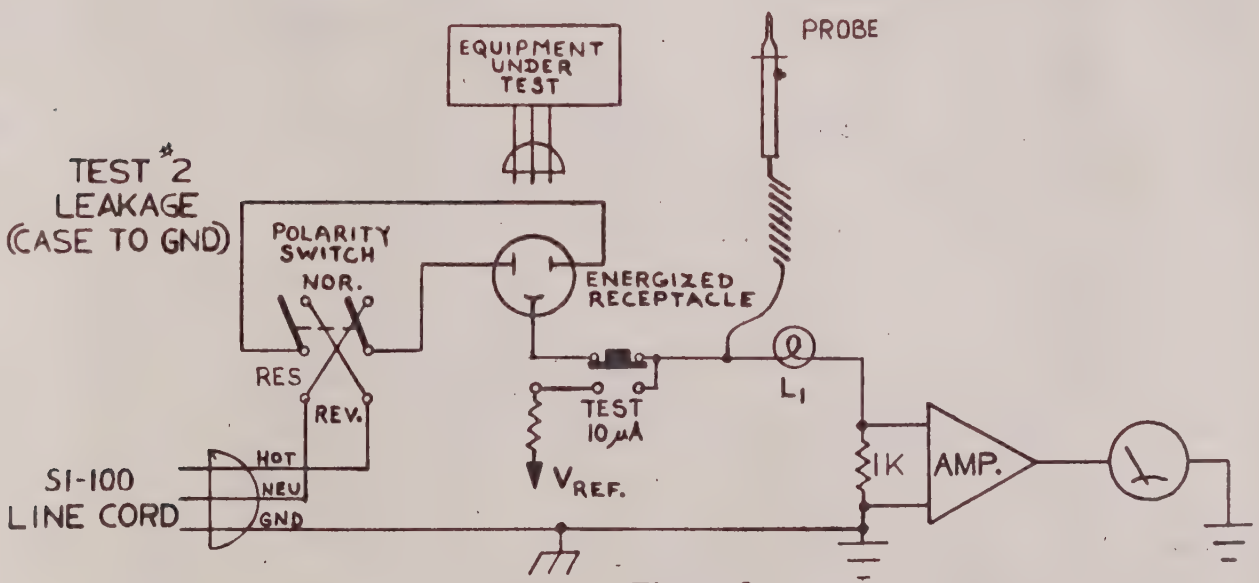


Figure 2.

Leakage Tests: Figure 2 is the block diagram of Model SI-100 during leakage tests. The 1000-ohm resistance is inserted in series with the ground return path of the E. U. T. To test for leakage, plug E. U. T. into the LEAKAGE receptacle. Take meter reading with the E. U. T. power switch ON and OFF in Normal and Reverse leakage positions on the Safety Inspector. With E. U. T. power switch OFF, measure the leakage of the line cord (usually, approximately 1 microampere per foot). Record readings on TF-24 test form.

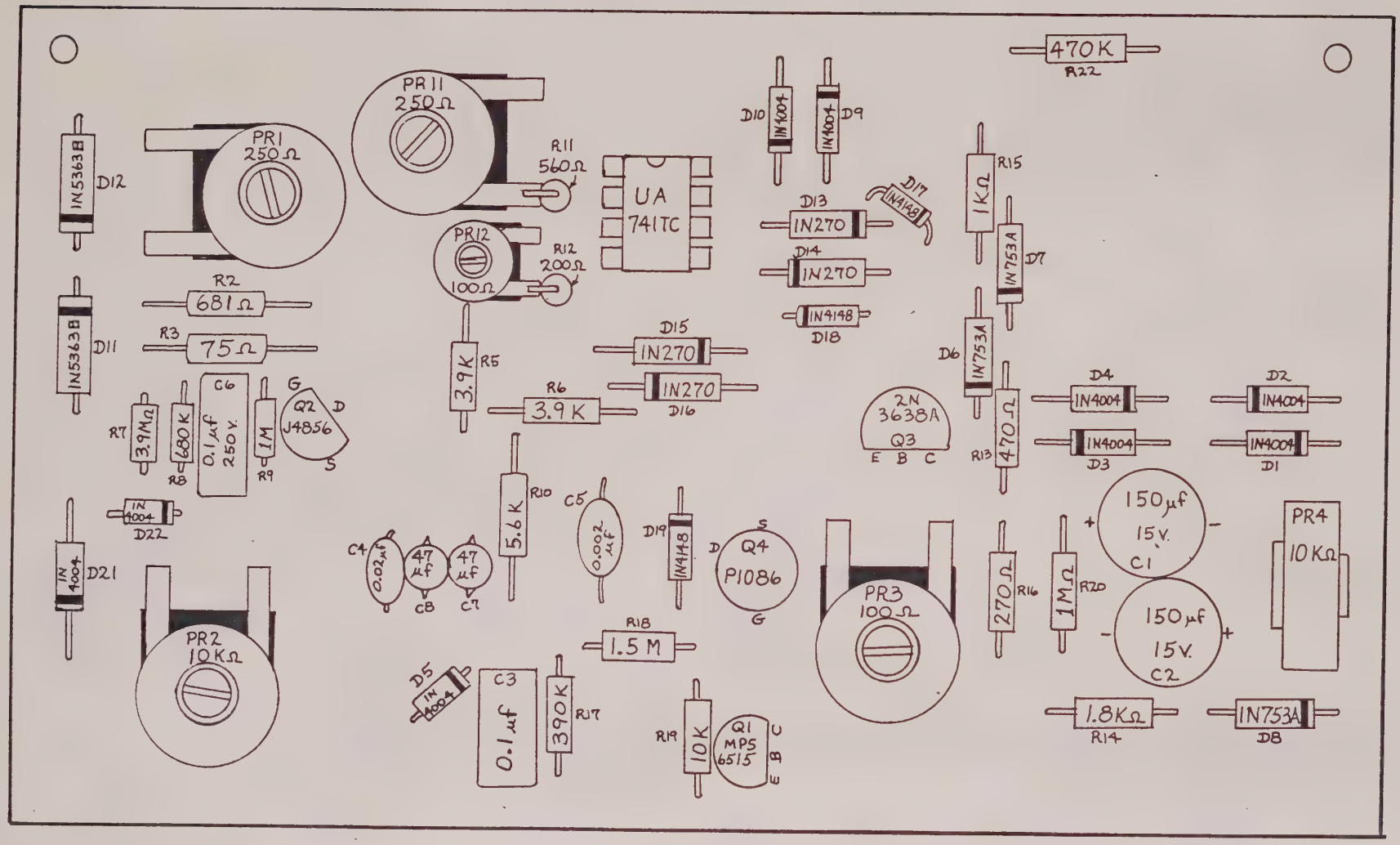
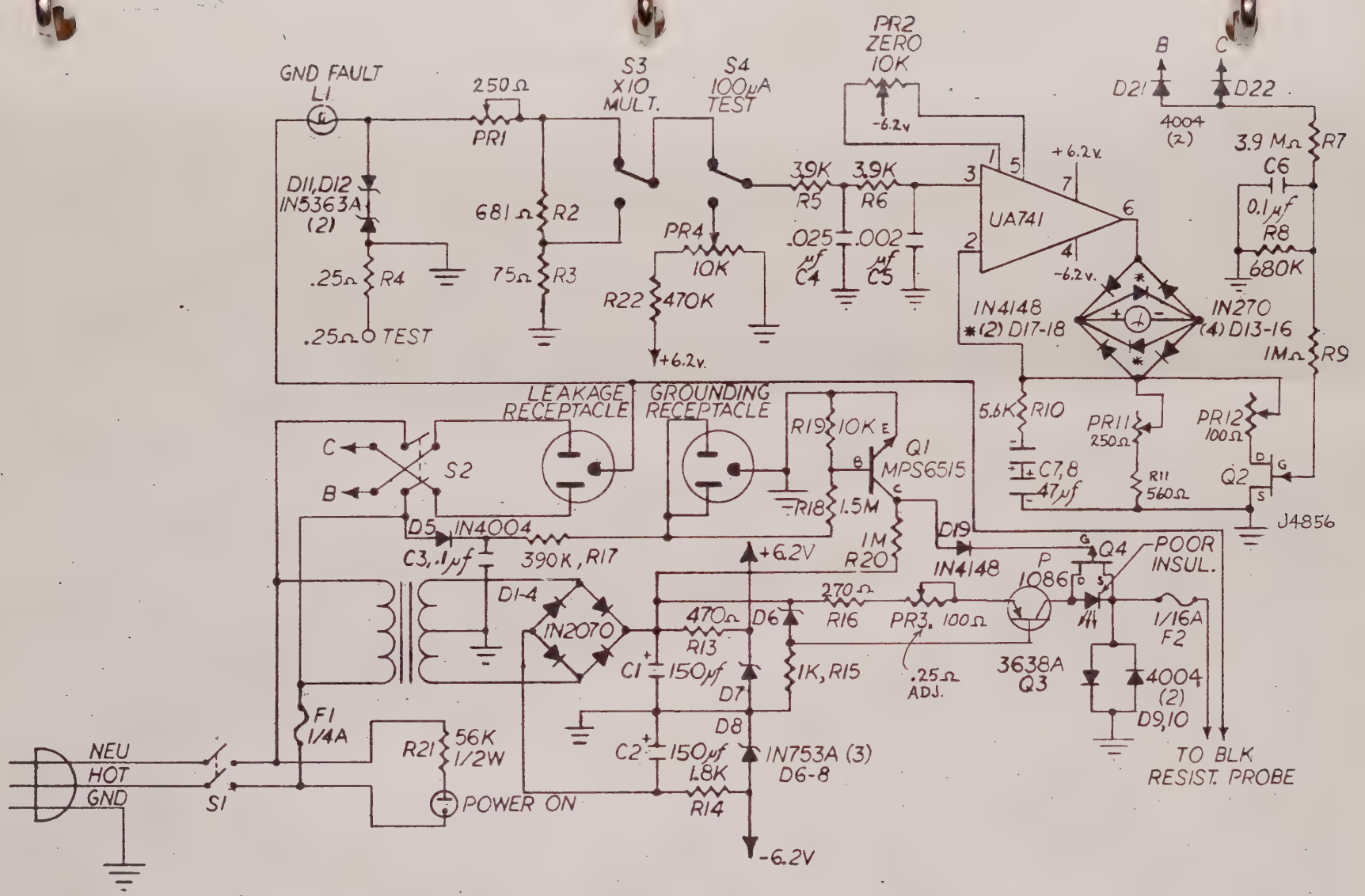


Figure 3. Printed Circuit Board Component Layout.



ALL RESISTORS 1/4W UNLESS OTHERWISE SPECIFIED

Figure 4.

DRN BY:	ohmic instruments 102 CHEW AVE. ST. MICHAELS, MARYLAND 21663
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DRN: 11/11/77	SAFETY INSPECTOR SCHEMATIC MODEL SI-100
REV:	

OPERATING NOTES

TROUBLE SHOOTING AND ALIGNMENT PROCEDURES: Figure 3 shows the printed circuit board and component layout of the SAFETY INSPECTOR; Figure 4 is the schematic diagram of SI-100. Parts normally used in service are: 1/4 A3AG and 1/16 A3AG fuses and; 120 volt, 15 watt, Model 15T7DC light bulb.

FIELD CALIBRATION PROCEDURE:

1. Remove bottom cover (8 screws). With the SI-100 still unplugged, plug an ohmmeter's test leads into the two ground slots on the SI-100's test receptacles and adjust the INPUT Z pot (PRI) on the printed circuit board until the ohmmeter reads exactly 1K. Disconnect the ohmmeter from the SI-100.

2. Plug the SI-100 into a properly polarized and grounded AC outlet. Turn it on and place selector switch in RESISTANCE position. Slowly adjust the ZERO pot (PR2) to obtain minimum reading on meter.

3. Place selector switch in LEAKAGE position and feed a 100mV, 80 Hz AC test signal into the ground slots mentioned in Step #1, using a voltmeter to monitor the signal level while it is connected. Adjust the larger of the two FS pots (PR11) until the SI-100 meter reads 100uA. Next, reduce AC signal level to 10mV and place selector switch in RESISTANCE position. Adjust the smaller FS pot (PR12) until the SI-100 meter again reads 100uA. Remove the AC test signal.

4. Place selector switch in LEAKAGE position and depress the 100uA TEST push-button. Adjust the 100uA pot (PR4) until meter reads 100uA.

5. Place selector switch in RESISTANCE position and insert the resistance probe into the .25ohm TEST jack. Make sure contact is firm. Depress button on probe and adjust the .25ohm pot (PR3) until meter indicates .25ohm.

6. Unplug the SI-100 and replace bottom cover and screws.

In case of any difficulty, please telephone OHMIC Instruments Company at either 301-745-2277 or 800-626-7713 and our engineers will be glad to assist you.

Oxford®

RV-1/2WE	WHITE
RV-1/2BK	BLACK
RV-1/2RB	ROYAL BLUE

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